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——S. Carlos von Koseritz has published "Bosquejos Ethnologicos," a series of papers contributed by him in the last three years to the Gazeta de Port Alegre on anthropological subjects in the province of Rio Grande do Sul and other parts of Brazil. Stone implements of a strictly Palæolithic type appear to be very rare in von Koseritz's collection, and as they occur promiscuously with Neolithic objects, the author infers that it is impossible to determine a Palæolithic antecedent to a Neolithic age in Brazil. Many pieces were found associated with the remains of the Megatherium, "*Rhinoceros tichorinus*"(*! !*) and the cave bear. But a skeleton recently found in a shell mound on the banks of a fresh-water lagoon near Cidreira, three miles from Rio Grande, convinces the writer that the early inhabitants of South Brazil were of a lower type than the Charruas and others in possession of that region in the historic period. The Botocudos of the Aimores mountains have more nearly the features of the Cidreira cranium (*Nature*, Aug. 21, 1884).——Those who are interested in the subject of the *jus prima noctis* will find it thoroughly discussed by Dr. Karl Schmidt in Zeitschrift für Ethnologie, XVII (1884), pp. 18–59. The author seems to be familiar with the literature of the subject, and gives innumerable references to authorities, ancient and modern.

MICROSCOPY.[1]

A MEANS OF DIFFERENTIATING EMBRYONIC TISSUES.—It may be safely assumed that all hardening and staining fluids possess, in a higher or lower degree, the power of *developing*, in the photographer's sense, histological distinctions between embryonic cells, long before these distinctions become manifest in perceptible morphological differences. It is evident, also, that this differentiating action varies in strength according to the conditions under which the reagents are applied. Our knowledge of the ways and means of controlling this action is still very meager; but it is sufficient to show that the histological technique of the future has much to hope for through experimentation in this direction. One of the best ways of intensifying the differential effects of hardening fluids, is to use several of them in combination or in sequence. The use of osmic acid, followed by Merkel's fluid, is an example of this kind. The advantages of this method in the study of pelagic fish eggs have already been noticed,[2] and I wish now to state briefly what the method will accomplish when applied to the eggs of Clepsine. The mode of procedure is as follows:

The eggs are placed in ¼ per cent solution of osmic acid for ten minutes, then rinsed in clean water and transferred to

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[1] Edited by Dr. C. O. WHITMAN, Mus. Comparative Zoology, Cambridge, Mass.

[2] AMERICAN NATURALIST, Nov., 1883, p. 1204, and Proc. Am. Acad. Arts and Sci., XX, p. 28, 1884.

Merkel's fluid (platinum chloride, ¼ per cent, and chromic acid, ¼ per cent, in equal parts), in which they are allowed to remain one and a half hours. They are next washed in flowing water for the same length of time, then treated with 50 per cent and 70 per cent alcohol. They need remain only a short time in the first grade of alcohol (about thirty minutes), but should be left for twelve to twenty-four hours in the second. For staining, I have used Grenacher's alcoholic borax-carmine, adding to it from one-third to one-half its volume of glycerine. The glycerine intensifies the action of the dye, so that a moderately deep stain is taken in the course of twenty-four hours.

It should be mentioned that it is best to stain immediately after the eggs have remained the required time in alcohol, as receptivity for the staining fluid diminishes considerably with the lapse of time. The osmic acid has time to penetrate to all parts of the embryo, and the blackening is arrested and partially removed by the action of Merkel's fluid. The differential effects of the osmic acid are, however, sharpened under the influence of the chrom-platinum solution.

This method has enabled me to trace out the history of the entoderm, and the precise origin of the nerve-chord, nephridia, salivary glands, larval glands, &c. The results of my study will be published in full later, and I shall here only give the more important conclusions. Each of the germ-bands, as I have shown elsewhere,[1] is made up of three distinct layers, namely: (1) an epidermal layer; (2) a layer consisting of four longitudinal rows of cells, and (3) a deeper layer, next to the yolk, composed of larger cells.

The four rows of cells, forming the layer subjacent to the epidermis, are the products of four larger cells at the posterior end of each germ-band. These four cells are called "*neuroblasts*" in the papers referred to. The innermost layer, which is wholly mesoblastic, is derived from a large "mesoblast," which lies below the four "neuroblasts." Thus the two deeper layers of each germ-band is made up of the products of five cells.

The main point to be determined was the precise origin of the nerve-chord. In my first paper dealing with this subject I was unable to settle this point satisfactorily. I satisfied myself that the nerve-chain was formed from the products of the so-called "neuroblasts," but I was mistaken in supposing that *all* of these products entered into its composition.

The method above given has shown that of the eight rows of these cells (four in each band), only the two median ones give rise to the nerve-chord. The lateral row of each band probably gives origin to muscular elements, while the two rows, lying between the median and the lateral rows, furnish the basis for the nephridial organs. The two median rows of nerve-cells are faintly browned with osmic acid, while the four rows of nephridial cells are deeply browned, forming thus a sharp contrast in color. The two lateral rows are faintly stained. The development of the ganglionic chain progresses from the head backwards, so that in surface views it is easy to trace the two simple rows of nerve-cells forward into the fully outlined ganglia. The same has been done on sections, leaving no doubt as to the origin of the nerve system of the trunk. I am not able to say whether the two rows of nerve-cells extend into the cephalic lobe; but I am certain that the nerve-collar, including the supra-œsophageal ganglia, is formed from cells that lie beneath the epidermis, and not from a thickening of the epidermis itself.

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[1] Quart. Jour. Mic. Sc., 1878, and Zool. Anz., No. 1.

The epidermis overlying the nerve-cells destined to form the four sub-œsophageal ganglia, thickens up at an early date and eventually becomes from two to three or more cells deep. This thickened portion of the epidermis has nothing whatever to do with the formation of any part of the nervous system. The deeper cells of this thickening form provisional gland-cells, which serve to attach the embryo, after its escape from the egg-membrane, to the ventral side of the parent. In this manner the young are carried about until the posterior sucker is developed sufficiently to serve as an organ of attachment. These gland-cells are colored dark brown, and are thus very easily distinguished from the lighter-colored nerve-cells lying beneath them.

The epithelium of the whole alimentary tract, excluding the stomodæum (pharynx) and proctodæum, which are derived from the epidermal layer, arises from free nuclei belonging to the three large blastomeres (*a*, *b* and *c* in my figures). The cells which form the œsophagus are the first in order of development, making their appearance just beneath the stomodæal thickening, in the very earliest stage of the germ-bands. From the mass of cells formed at this point arise not only the œsophageal epithelium, but also the salivary glands. The method employed gives preparations in which all the embryonic tissues of the head and anterior portion of the trunk (epidermis, larval gland, salivary glands, nerve-cells, muscle-cells, and œsophageal epithelium) are distinguishable.

The cells destined to form the epithelial lining of the stomach arise later than those of the œsophagus. They appear first as distinct cells, on the ventral side, at the anterior end of the future stomach, at about the time of hatching. Their development is progressive from this point backward and upward towards the dorsal side. In an embryo just hatched, I can trace these cells along nearly the anterior half of the median ventral line, and farther back I find free nuclei in the surface of the yolk. In the median dorsal line, I find no fully formed endoderm cells (except salivary gland-cells), but do find free nuclei in the anterior half.

The sense-organs of the lip arise as bulb-like thickenings of the epidermis. At the time of hatching, long before the eyes and segmental sense-organs appear, two pairs of these sense-bulbs are found, symmetrically placed on the surface that is to form the margin of the lip. The symmetrical arrangement in pairs, the second pair being a little behind the first and farther apart, suggests that these organs were primarily strictly segmental.—*C. O. Whitman.*

REPAIRING BALSAM PREPARATIONS.—When balsam preparations have been made with a very thin solution, or with a small amount of fluid, evaporation sometimes causes the balsam to be invaded by air spaces which it is difficult to refill, even with a thin solution of balsam. Such spaces may readily be filled with the solvent of the balsam (benzole), and then a drop of thin balsam placed at the edge of the cover glass will gradually replace the benzole as it evaporates, without leaving air spaces. To prevent a too rapid introduction of the benzole, it is desirable to transfer it with a glass tube drawn to capillary fineness at one end, rather than with a glass rod. If the tube is not too large—5 or 10^{mm}—and is drawn out quite gradually, enough benzole may be sucked into it to serve for repairing a large number of slides without danger of loss by its running out or by evaporation when the tube is laid down. The application of the capillary end of the tube to the edge of the cover glass induces a steady and even flow of the fluid, until the space beneath the cover glass is completely filled. —*E. L. Mark.*

THE EYES OF ANNELIDS.[1]—For the study of these small eyes it is necessary to make very fine sections and to remove the pigment. The decoloration of the eye may be effected by soaking in glycerine, to which a little 35 per cent caustic potash has been added. When the work of decoloring has been carried sufficiently far, it should be checked by neutralizing with dilute hydrochloric acid; and then the preparation should be carefully washed before transferring to a hardening or mounting fluid. The preparations are best preserved in glycerine.

A NEW SOLVENT OF CHITIN.—In a previous number of "Microscopy" I have called attention to the use of hypochlorite of potassium (KClO), or Eau de Javelle, as an agent for removing the soft parts of such animals as Spongilla, and for preparing skeletons of small animals. Dr. Looss[2] now recommends this fluid and the corresponding combination with sodium (NaClO) as excellent solvents of chitin. The thickest and hardest chitinous parts of insects, after soaking long enough to become transparent and perfectly colorless, may be quickly dissolved by boiling in one of these agents.

If the commercial fluid is diluted by adding 4-6 times its volume of water, and the chitinous parts to be studied immersed (either fresh or hardened) for twenty-four hours or more, the chitin is rendered permeable to staining fluids. Nematodes and their eggs may be successfully treated in the same manner. It is remarkable that the underlying soft parts do not suffer, the finest structural conditions being preserved. The potassium compound acts with more energy than the sodium compound.

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[1] Graber, Archiv. f. mikr. Anat., XVII., p. 250, 1879.

[2] Zool. Anzeiger, VIII, No. 196, p. 333, June, 1885.

WHITE ZINC CEMENT.—This cement is recommended, by Dr. Frank L. James, as superior to those in general use for inclosing preparations mounted in glycerine. The following are his directions for preparing it:

Dissolve gum damar in pure benzol sufficient to make a solution of the consistency of a thin syrup, and filter through absorbent cotton. Into a porcelain capsule put a small quantity of chemically pure oxide of zinc, free from moisture (a precaution which is best assured by heating the zinc in a muffle for a short time prior to using it), and, having previously wet it with a small quantity of benzol, add sufficient of the damar solution to make a paste the consistency of cream or a thick paint. Rub with the muller or pestle until perfectly smooth, and then pour into a stock bottle. Repeat the operation until a sufficient amount of the cement is obtained. The fluid should now be filtered through absorbent cotton to remove all of the grosser particles of the zinc which escaped the action of the muller. It may now be allowed to stand until the zinc subsides to the bottom. If the fluid has been used in proper proportion the zinc will occupy about half of the entire mass. In other words, the fluid and zinc should be in about equal proportions. If there be too much fluid, a portion may be decanted, while if there be too little the requisite amount may be added from the damar solution. The operation is finished by adding sufficient drying oil (boiled linseed or nut oil) to give the cement a proper toughness.

The cause of the so-called "creeping" of glycerine, leakage of cells, etc., is explained by the same author, as follows:

All of the cements which I have enumerated and described in the preceding chapters, with the exception of gold size, consist of some solid material or materials dissolved or held in suspension in a medium more or less volatile, the evaporation of which again leaves a solid mass. The exception, gold size, hardens partly, though very slightly, by evaporation, its solidification depending principally upon oxidation. In the process of hardening or setting, the bulk or mass of the cement is very materially altered, a decrease in volume occurring which is proportionate to the amount of volatile matter lost in drying. *The cement shrinks.*

Now, when a cell is properly finished it must be entirely filled with the mounting medium. If it is not so filled we are bound to have air bubbles, the *bête noir* of microscopists, which are not only unsightly, but will, in process of time, ruin the mount. If the cell walls were not entirely dry when the cell was closed, it is plain that the process of shrinkage had not yet been completed, and that it is yet to occur to a greater or less extent. What is the inevitable result? The fluid within the cell is practically incompressible, yet pressure is brought upon it. It has no space within its container into which it can retreat, and consequently it must force its way out of it. This it does slowly and gradually. It may be some time before it is noticed, but it is bound to come. The cement gives way at its weakest point, and the fluid exudes—"creeps" out. It is discovered, washed off and a fresh ring of cement applied. This puts off the evil day a while, but in a few months the process has to be repeated. Meanwhile the pressure is continuously exerted, and minute quantities of the mounting medium gradually infiltrate the walls at fresh points; the cement disintegrates, scales, and splits off. The remedy proposed is—*Never use a cell until the cement walls are thoroughly dry and hard.—Nat. Druggist, April 4, 1885.*

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SCIENTIFIC NEWS.

— The two Portuguese explorers, Captain Capello and Commander Ivens, arrived at Cape Town on July 16th, and left again soon afterwards for Mossamedes, with the intention of returning to Europe via the Congo. They have traversed a region which no European had ever set foot in, as leaving Mossamedes in March, 1884, they reached Quillimane, on the eastern coast to the south of Mozambique, in May last, having traveled over 4500 miles of territory, 3000 miles of which were previously unexplored. They discovered the sources of the Lualaba, an affluent of the Congo, which has been so frequently referred to at recent geographical discussions. They also came upon a region which is extraordinarily rich in copper, this being the district of Yaranganga, situated between the Lualaba and the Luapula. They also made a discovery which may be of great use to commerce and science. It has often been remarked that the venomous African fly, the tsetsé, which did so much mischief to cattle in the south-east of Africa, and had almost extinguished trade between Delagoa bay and the Transvaal, had totally disappeared of late. Messrs. Capello and Ivens found that this fly was still very abundant further north, and that, as had often been stated before, it was always to be seen where there were plenty of elephants. Stanley, in the course of his travels, had observed the same phenomenon, and it follows, therefore, that the region explored by the two Portuguese travelers is rich in ivory.—*English Mechanic.*